REMARKS

This is in response to the Notice of Non-Compliance Amendment mailed on January 26, 2009.

Claim 8 has been amended and now reflects the proper status identifier. We have reviewed the entry in PAIR for the present application. It is our understanding that the original response to the Office Action of October 16, 2008, mailed on January 14, 2009, was complete. The response of January 14, 2009 contains a legible copy of the amended claims. However, it appears that sections of the response have been placed out of order upon receipt by the USPTO. In order to advance prosecution of the application, we are resubmitting the complete Amendment and Response to clarify the records at the United States Patent and Trademark Office.

Claims 1 – 16 are currently pending. Claims 1 – 16 have been amended. No new matter has been added. Claims 9, 10, and 11 have been amended to correct typographical errors.

Claim Objections

Claims 1 – 16 are objected to because the Specification does not provide explanation for "a thermodynamic cracking process." The objection is traversed.

Nonetheless, solely to advance prosecution, claims 1 – 16 have been amended to delete "thermodynamic" from the claims.

Withdrawal of the objections to claims 1 – 16 is requested.

Claim Rejections under 35 U.S.C. 112

Claim 12 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The rejection is traversed.

Nonetheless, solely to advance prosecution, Applicants have amended the specification as described above. The amendment to the specification is based on the fact that the inserted

paragraph is essentially Claim 12 of the priority document PCT/NO2005/000040 (WO 2005/078051).

In view of the foregoing, the amendment overcomes the rejection of the Office Action of claim 12 under 35 U.S.C. 112, first paragraph, and withdrawal of the rejection is requested.

Claim Rejection under 35 U.S.C. 103

Claims 1 – 16 are rejected under 35 U.S.C. 103(a) as being obvious over Ellingsen (US 6,660,158). The rejection is traversed for at least the following reasons.

First, the present claimed invention differs from Ellingsen in that Ellingsen is a process for heavy oil comprising a reactor with a rotating fluidized bed catalyst and whereby the compressed gases and/or steam is injected into the bed in order to effect movement of the catalyst bed (FIG 4). The fundamental difference between Ellingsen and the present claimed invention is that in the present invention the cracking takes place in the riser of varying cross section (FIG.1, F) which is attached to a cyclone (FIG. 1, N). In Ellingsen the riser (FIG. 1, o) is simply used to pneumatically suck off the regenerated catalyst from the regenerator (column 6, 57 – 59 of Ellingsen). Velocities in the riser of the present invention are of crucial importance and are achieved through different diameters of the riser. For example, the diameter can be increased 100% above the injection port of the feed and reduced before the entrance to the cyclone N (*See* page 6, paragraph [0091] and FIG. 1). Ellingsen does not have a riser with varying cross section.

Second, the present disclosure provides a cracking process for the upgrading of heavy oils using a riser with varying cross section. The varying cross section of the riser allows for control of accelerating and retarding energy carriers colliding with atomized droplets of oil which undergo instant vaporization, with subsequent cracking. Contrary to all fluidizing catalytic processes according to the prior art, the present cracking process can use neutral pulverized particles such as sand as energy carriers.

Neutral pulverized sand particles can be used in the process of the present invention because by using combination gases in the regeneration of the coke an extremely low partial pressure is established for the oil. Therefore, the process can be carried out at a temperature that is about 50% lower than the final boiling point of the oil. For example, an API oil from Venezuela with a final boiling point of 825°C was cracked to a 22.5 API light oil at temperature of the energy carrier (the sand) of 480°C (*See* page 5, paragraph [0088]; page 6 paragraphs [0089] and [0090]; and the Table below for other examples).

Material	Initial API	Upgraded API	Regenerator Temp (°C)	Feed Temp. (°C)	Riser Temp (°C)
Oil pit oil (Venezuela)	6.2	22.5	480	150	360
Crude Melones (Venezuela)	9.3	20	475	135	325
Blended Oil Melones (Venezuela)	14.9	21.5	490	145	355
Lloydminster Heavy Oil	13.18	25.2	465	150	355
Canadian Tar Sand Oil	12.5	24	473	145	330

Cracking forces of the present process claims are characterized by (i) thermal forces, i.e. heat that effects strong thermal movements of the molecules of the oil, but which are not strong enough to bring about cracking and (ii) mechanical forces, i.e. strong mechanical shear forces are created due to the collision of the two streams whereby the oil is injected in atomized form. These forces can be calculated from standard force equations such as $F = mv/dT$, wherein F =

force, m= mass of the particle (kg), v = velocity of the particle (m/s) and dT = collision time (s). When particles collide the impacts are plastic or semi-plastic with subsequent change of velocities. The change of velocities causes the kinetic energy to be transformed to heat, which contributes to internal temperatures changes or "hotspots."

By arranging different cross sections of the riser with the deviations shown in the application local cavitations in the stream will take place leading to microscopic points of low pressure, similar to the negative pressure created under an airplane wing. This allows for cracking oil under conditions not previously known within the field of upgrading of heavy oils. This translates into a higher energy density which makes it possible to build a cracking plant considerably smaller than plants using presently known cracking processes. Due to the fact that the transport of sand takes place with the combustion gases, the process may be driven by an over pressure of lass than 100 mbar, whereby the pressure classification of the different components may be avoided.

One of the general problems with the catalytic processes is the metal content of the oil that is to be upgraded. In processes of this sort, the metals lead to uncontrollable formulation of unwanted compounds. In connection with the present invention it as been documented that the metal content of the oil after treatment is reduced by approximately 90% and the sulphur content by about 50%. This is due to the fact that sine the process is completely dry (i.e. the oil is in gaseous form) metal sulfides are made during the exothermic reaction of the metals.

Ellingsen does not teach or suggest a varied diameter riser for cracking oil of the present invention. Therefore, the present invention is not obvious over Ellingsen. Applicants respectfully request withdrawal of the rejections under 35 U.S.C. 103(a). Applicants do not otherwise concede the correctness of the rejections and reserve the right to make additional arguments as may be necessary.

Conclusion

In view of the above amendments and remarks, a Notice of Allowance is requested. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone the undersigned at the below-listed telephone number.

Please charge any additional fees or credit any overpayment to Merchant & Gould P.C., Deposit Account No. 13-2725.

Respectfully submitted,

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